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10/661,326	09/12/2003	David A. Cook	062891.1141	9358

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EXAMINER	
O CONNOR, BRIAN T	

ART UNIT	PAPER NUMBER
2419	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/661,326	COOK ET AL.	
	Examiner	Art Unit	
	BRIAN O CONNOR	2419	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 January 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This office action is in response to applicant's amendment filed on 1/21/2009.

2. Claims 1-21 are currently pending.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-5, 7-10, 12-15, and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen (US 6,553,423) in view of Ogier et al. (US 7,327,683; hereafter Ogier) and further in view of Gao ("On Inferring Autonomous System Relationships in the Internet", Dec. 2001, IEEE/ACM Transactions on Networking, Vol. 9, pg 733-745; hereafter Gao) and further in view of Visser et al. (US 7,236,453).

With respect to claim 1, Chen discloses a router (500 of Figure 4) inside an autonomous system (AS3 of Figure 4) that receives BGP advertisements (Abstract; column 5, lines 10-19) from another router (500 of Figure 4) inside a second autonomous system (AS2 of Figure 4). A relationship is created between the router in AS3 and the router in AS2 (column 5, lines 20-30; column 5, lines 56-66). Chen's system also teaches a third router (500 of Figure 4) inside a third autonomous system

(AS1 of Figure 4) that sends capability update messages to the router in AS2 (column 6, lines 17-44).

Chen does not disclose marking edges, that represent a connection between two AS, as tentative; determining whether a first AS claims a connection to a second AS; determining from an advertisement communication whether a second AS claims a connection to the first AS system; if the first AS claims a connection to the second AS and the second AS claims a connection to the first AS then establish that there is a two-way connection between the first and second ASs; if there is a two-way connection between the first and second AS the mark the edge as verified; and if there is no two-way connection between the first and second AS remove the edge between the first and second ASs.

Ogier discloses a group of autonomous systems (18 of Figure 5; A, B, C, D, E of Figure 5) that transmit hello messages to one another (2810 of Figure 28) to build a network connection database (Abstract; column 6, lines 27-37). When a hello message arrived at one AS a series of tests and checks are perform to update the state of the connection between the receiving AS and a neighboring AS (column 6, lines 46-55). When the hello message is first received, the status of the neighbor is temporarily set to LOST (2820 of Figure 28; column 51, lines 31-36; viewed as equivalent to setting edge connection to tentative). Ogier's AS also checks if the hello message was a reply from a neighbor, and if it was from a neighbor then the status of the connection is set to '2-WAY' (2844 of Figure 28; column 52, lines 26-31). When a hello message is first received, the AS will send a neighbor reply to verify the existing 2-way connection (2834

of Figure 28; column 51, lines 50-60; column 51, lines 65-67; where "node i will attempt to verify 2-WAY communication"). The AS will also check a running timer and if the connection is not "2-WAY" (the connection is set to "1-WAY") then the status is changed to "LOST" and the connection is removed (column 53, lines 33-36).

Ogier teaches the benefit of faster updates by using small hello messages (column 3, liens 15-17) to update routing affected by broken links (column 6, lines 55-60). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the AS of Ogier with the routers of Chen.

Chen does not disclose creating directed graphs by the routers.

Gao, in an invention for autonomous system connections (Abstract), teaches an algorithm to create autonomous system graphs (Figure 4; Figure 5; left column, section A, pg 739). The graphs are used to see relationships between nodes and autonomous systems (left column, 4th full paragraph, pg 739).

Gao teaches the benefit of greater contract support and greater backup connectivity by building graphs for autonomous systems (right column, first full paragraph, pg 733). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the graph creation as taught by Gao with the system of Chen.

Chen does not disclose receiving an advertisement comprising a list of all autonomous systems connect to a single autonomous system and for each connection claimed by the single autonomous system with another autonomous system within an

inter-network that is reciprocated by the other autonomous system establishing a two-way connectivity.

Visser discloses sending all routes from one router (10 of Figure 1) to another router (14, 15 of Figure 1) in a BGP protocol network (column 3, lines 21-25; column 4, lines 13-19). Once a router obtains all the routes from its neighboring router it would be able to create two-way connections as shown by Ogier.

Visser teaches the benefit of less network disruption by hiding router failures with redundant BGP information (column 2, lines 3-5). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the method of Visser with the system of Chen.

With respect to claim 2, Chen further discloses receiving update messages (column 6, lines 17-30) containing routing information.

Chen does not disclose performing verification by the routers.

Ogier discloses a group of autonomous systems (18 of Figure 5; A, B, C, D, E of Figure 5) that transmit hello messages to one another (2810 of Figure 28) to build a network connection database (Abstract; column 6, lines 27-37). When a hello message is first received, the AS will send a neighbor reply to verify the existing 2-way connection (2834 of Figure 28; column 51, lines 50-60; column 51, lines 65-67; where "node i will attempt to verify 2-WAY communication").

Ogier teaches the benefit of faster updates by using small hello messages (column 3, liens 15-17) to update routing affected by broken links (column 6, lines 55-

60). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the AS of Ogier with the routers of Chen.

Chen does not disclose creating directed graphs by the routers.

Gao, in an invention for autonomous system connections (Abstract), teaches an algorithm to create autonomous system graphs (Figure 4; Figure 5; left column, section A, pg 739). The graphs are used to see relationships between nodes and autonomous systems (left column, 4th full paragraph, pg 739).

Gao teaches the benefit of greater contract support and greater backup connectivity by building graphs for autonomous systems (right column, first full paragraph, pg 733). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the graph creation as taught by Gao with the system of Chen.

With respect to claim 3, Chen further discloses a router (500 of Figure 4) as a network element.

With respect to claim 4, Chen fails to disclose a table that is referenced to verify one or more autonomous system paths.

Ogier discloses a group of autonomous systems (18 of Figure 5; A, B, C, D, E of Figure 5) that transmit hello messages to one another (2810 of Figure 28) to build a network connection database (Abstract; column 6, lines 27-37). Each AS has a table of neighbors (1932 of Figure 19).

Ogier teaches the benefit of faster updates by using small hello messages (column 3, liens 15-17) to update routing affected by broken links (column 6, lines 55-

60). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the AS of Ogier with the routers of Chen.

Chen fails to disclose a directed graph stored in a table.

Gao, in an invention for autonomous system connections (Abstract), teaches an algorithm to create autonomous system graphs (Figure 4; Figure 5; left column, section A, pg 739). The graphs are used to see relationships between nodes and autonomous systems (left column, 4th full paragraph, pg 739).

Gao teaches the benefit of greater contract support and greater backup connectivity by building graphs for autonomous systems (right column, first full paragraph, pg 733). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the graph creation as taught by Gao with the system of Chen.

With respect to claim 5, Chen further discloses using a Border Gateway Protocol to send the update messages (Abstract).

With respect to claim 7, Chen discloses a method for a router (500 of Figure 4) inside an autonomous system (AS3 of Figure 4) that receives BGP advertisements (Abstract; column 5, lines 10-19) from another router (500 of Figure 4) inside a second autonomous system (AS2 of Figure 4). A relationship is created between the router in AS3 and the router in AS2 (column 5, lines 20-30; column 5, lines 56-66). Chen's system also teaches a third router (500 of Figure 4) inside a third autonomous system (AS1 of Figure 4) that sends capability update messages to the router in AS2 (column 6, lines 17-44).

Chen does not disclose marking edges, that represent a connection between two AS, as tentative; determining whether a first AS claims a connection to a second AS; determining from an advertisement communication whether a second AS claims a connection to the first AS system; if the first AS claims a connection to the second AS and the second AS claims a connection to the first AS then establish that there is a two-way connection between the first and second ASs; if there is a two-way connection between the first and second AS the mark the edge as verified; and if there is no two-way connection between the first and second AS remove the edge between the first and second ASs.

Ogier discloses a group of autonomous systems (18 of Figure 5; A, B, C, D, E of Figure 5) that transmit hello messages to one another (2810 of Figure 28) to build a network connection database (Abstract; column 6, lines 27-37). When a hello message arrived at one AS a series of tests and checks are perform to update the state of the connection between the receiving AS and a neighboring AS (column 6, lines 46-55). When the hello message is first received, the status of the neighbor is temporarily set to LOST (2820 of Figure 28; column 51, lines 31-36; viewed as equivalent to setting edge connection to tentative). Ogier's AS also checks if the hello message was a reply from a neighbor, and if it was from a neighbor then the status of the connection is set to '2-WAY' (2844 of Figure 28; column 52, lines 26-31). When a hello message is first received, the AS will send a neighbor reply to verify the existing 2-way connection (2834 of Figure 28; column 51, lines 50-60; column 51, lines 65-67; where "node i will attempt to verify 2-WAY communication"). The AS will also check a running timer and if the

connection is not "2-WAY" (the connection is set to "1-WAY") then the status is changed to "LOST" and the connection is removed (column 53, lines 33-36).

Ogier teaches the benefit of faster updates by using small hello messages (column 3, liens 15-17) to update routing affected by broken links (column 6, lines 55-60). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the method of Ogier with the method of Chen.

Chen does not disclose creating directed graphs by the routers.

Gao, in an invention for autonomous system connections (Abstract), teaches an algorithm to create autonomous system graphs (Figure 4; Figure 5; left column, section A, pg 739). The graphs are used to see relationships between nodes and autonomous systems (left column, 4th full paragraph, pg 739).

Gao teaches the benefit of greater contract support and greater backup connectivity by building graphs for autonomous systems (right column, first full paragraph, pg 733). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the graph creation as taught by Gao with the method of Chen.

Chen does not disclose receiving an advertisement comprising a list of all autonomous systems connect to a single autonomous system and for each connection claimed by the single autonomous system with another autonomous system within an inter-network that is reciprocated by the other autonomous system establishing a two-way connectivity.

Visser discloses sending all routes from one router (10 of Figure 1) to another router (14, 15 of Figure 1) in a BGP protocol network (column 3, lines 21-25; column 4, lines 13-19). Once a router obtains all the routes from its neighboring router it would be able to create two-way connections as shown by Ogier.

Visser teaches the benefit of less network disruption by hiding router failures with redundant BGP information (column 2, lines 3-5). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the method of Visser with the method of Chen.

With respect to claim 8, Chen further discloses receiving update messages (column 6, lines 17-30) containing routing information.

Chen does not disclose performing verification by the routers.

Ogier discloses a group of autonomous systems (18 of Figure 5; A, B, C, D, E of Figure 5) that transmit hello messages to one another (2810 of Figure 28) to build a network connection database (Abstract; column 6, lines 27-37). When a hello message is first received, the AS will send a neighbor reply to verify the existing 2-way connection (2834 of Figure 28; column 51, lines 50-60; column 51, lines 65-67; where "node i will attempt to verify 2-WAY communication").

Ogier teaches the benefit of faster updates by using small hello messages (column 3, liens 15-17) to update routing affected by broken links (column 6, lines 55-60). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the method of Ogier with the method of Chen.

Chen does not disclose creating directed graphs by the routers.

Gao, in an invention for autonomous system connections (Abstract), teaches an algorithm to create autonomous system graphs (Figure 4; Figure 5; left column, section A, pg 739). The graphs are used to see relationships between nodes and autonomous systems (left column, 4th full paragraph, pg 739).

Gao teaches the benefit of greater contract support and greater backup connectivity by building graphs for autonomous systems (right column, first full paragraph, pg 733). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the graph creation as taught by Gao with the method of Chen.

With respect to claim 9, Chen fails to disclose a table that is referenced to verify one or more autonomous system paths.

Ogier discloses a group of autonomous systems (18 of Figure 5; A, B, C, D, E of Figure 5) that transmit hello messages to one another (2810 of Figure 28) to build a network connection database (Abstract; column 6, lines 27-37). Each AS has a table of neighbors (1932 of Figure 19).

Ogier teaches the benefit of faster updates by using small hello messages (column 3, liens 15-17) to update routing affected by broken links (column 6, lines 55-60). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the method of Ogier with the method of Chen.

Chen fails to disclose a directed graph stored in a table.

Gao, in an invention for autonomous system connections (Abstract), teaches an algorithm to create autonomous system graphs (Figure 4; Figure 5; left column, section

A, pg 739). The graphs are used to see relationships between nodes and autonomous systems (left column, 4th full paragraph, pg 739).

Gao teaches the benefit of greater contract support and greater backup connectivity by building graphs for autonomous systems (right column, first full paragraph, pg 733). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the graph creation as taught by Gao with the method of Chen.

With respect to claim 10, Chen further discloses using a Border Gateway Protocol to send the update messages (Abstract).

With respect to claim 12, Chen discloses a router (500 of Figure 4) inside an autonomous system (AS3 of Figure 4) that receives BGP advertisements (Abstract; column 5, lines 10-19) from another router (500 of Figure 4) inside a second autonomous system (AS2 of Figure 4). A relationship is created between the router in AS3 and the router in AS2 (column 5, lines 20-30; column 5, lines 56-66). Chen's system also teaches a third router (500 of Figure 4) inside a third autonomous system (AS1 of Figure 4) that sends capability update messages to the router in AS2 (column 6, lines 17-44). The router is build with a network interface (510A of Figure 5; viewed as a means for receiving and a means for responding) and a route processor (502 of Figure 5; viewed as a means for identifying).

Chen does not disclose marking edges, that represent a connection between two AS, as tentative; determining whether a first AS claims a connection to a second AS; determining from an advertisement communication whether a second AS claims a

connection to the first AS system; if the first AS claims a connection to the second AS and the second AS claims a connection to the first AS then establish that there is a two-way connection between the first and second ASs; if there is a two-way connection between the first and second AS the mark the edge as verified; and if there is no two-way connection between the first and second AS remove the edge between the first and second ASs.

Ogier discloses a group of autonomous systems (18 of Figure 5; A, B, C, D, E of Figure 5) that transmit hello messages to one another (2810 of Figure 28) to build a network connection database (Abstract; column 6, lines 27-37). When a hello message arrived at one AS a series of tests and checks are perform to update the state of the connection between the receiving AS and a neighboring AS (column 6, lines 46-55). When the hello message is first received, the status of the neighbor is temporarily set to LOST (2820 of Figure 28; column 51, lines 31-36; viewed as equivalent to setting edge connection to tentative). Ogier's AS also checks if the hello message was a reply from a neighbor, and if it was from a neighbor then the status of the connection is set to '2-WAY' (2844 of Figure 28; column 52, lines 26-31). When a hello message is first received, the AS will send a neighbor reply to verify the existing 2-way connection (2834 of Figure 28; column 51, lines 50-60; column 51, lines 65-67; where "node i will attempt to verify 2-WAY communication"). The AS will also check a running timer and if the connection is not "2-WAY" (the connection is set to "1-WAY") then the status is changed to "LOST" and the connection is removed (column 53, lines 33-36).

Ogier teaches the benefit of faster updates by using small hello messages (column 3, liens 15-17) to update routing affected by broken links (column 6, lines 55-60). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the AS of Ogier with the routers of Chen.

Chen does not disclose creating directed graphs by the routers.

Gao, in an invention for autonomous system connections (Abstract), teaches an algorithm to create autonomous system graphs (Figure 4; Figure 5; left column, section A, pg 739). The graphs are used to see relationships between nodes and autonomous systems (left column, 4th full paragraph, pg 739).

Gao teaches the benefit of greater contract support and greater backup connectivity by building graphs for autonomous systems (right column, first full paragraph, pg 733). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the graph creation as taught by Gao with the system of Chen.

Chen does not disclose receiving an advertisement comprising a list of all autonomous systems connect to a single autonomous system and for each connection claimed by the single autonomous system with another autonomous system within an inter-network that is reciprocated by the other autonomous system establishing a two-way connectivity.

Visser discloses sending all routes from one router (10 of Figure 1) to another router (14, 15 of Figure 1) in a BGP protocol network (column 3, lines 21-25; column 4,

lines 13-19). Once a router obtains all the routes from its neighboring router it would be able to create two-way connections as shown by Ogier.

Visser teaches the benefit of less network disruption by hiding router failures with redundant BGP information (column 2, lines 3-5). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the method of Visser with the system of Chen.

With respect to claim 13, Chen further discloses receiving update messages (column 6, lines 17-30) containing routing information.

Chen does not disclose performing verification by the routers.

Ogier discloses a group of autonomous systems (18 of Figure 5; A, B, C, D, E of Figure 5) that transmit hello messages to one another (2810 of Figure 28) to build a network connection database (Abstract; column 6, lines 27-37). When a hello message is first received, the AS will send a neighbor reply to verify the existing 2-way connection (2834 of Figure 28; column 51, lines 50-60; column 51, lines 65-67; where "node i will attempt to verify 2-WAY communication").

Ogier teaches the benefit of faster updates by using small hello messages (column 3, liens 15-17) to update routing affected by broken links (column 6, lines 55-60). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the AS of Ogier with the routers of Chen.

Chen does not disclose creating directed graphs by the routers.

Gao, in an invention for autonomous system connections (Abstract), teaches an algorithm to create autonomous system graphs (Figure 4; Figure 5; left column, section

A, pg 739). The graphs are used to see relationships between nodes and autonomous systems (left column, 4th full paragraph, pg 739).

Gao teaches the benefit of greater contract support and greater backup connectivity by building graphs for autonomous systems (right column, first full paragraph, pg 733). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the graph creation as taught by Gao with the system of Chen.

With respect to claim 14, Chen fails to disclose a table that is referenced to verify one or more autonomous system paths.

Ogier discloses a group of autonomous systems (18 of Figure 5; A, B, C, D, E of Figure 5) that transmit hello messages to one another (2810 of Figure 28) to build a network connection database (Abstract; column 6, lines 27-37). Each AS has a table of neighbors (1932 of Figure 19).

Ogier teaches the benefit of faster updates by using small hello messages (column 3, liens 15-17) to update routing affected by broken links (column 6, lines 55-60). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the AS of Ogier with the routers of Chen.

Chen fails to disclose a directed graph stored in a table.

Gao, in an invention for autonomous system connections (Abstract), teaches an algorithm to create autonomous system graphs (Figure 4; Figure 5; left column, section A, pg 739). The graphs are used to see relationships between nodes and autonomous systems (left column, 4th full paragraph, pg 739).

Gao teaches the benefit of greater contract support and greater backup connectivity by building graphs for autonomous systems (right column, first full paragraph, pg 733). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the graph creation as taught by Gao with the system of Chen.

With respect to claim 15, Chen further discloses using a Border Gateway Protocol to send the update messages (Abstract).

With respect to claim 17, Chen discloses a method for a router (500 of Figure 4) inside an autonomous system (AS3 of Figure 4) that receives BGP advertisements (Abstract; column 5, lines 10-19) from another router (500 of Figure 4) inside a second autonomous system (AS2 of Figure 4). A relationship is created between the router in AS3 and the router in AS2 (column 5, lines 20-30; column 5, lines 56-66). Chen's system also teaches a third router (500 of Figure 4) inside a third autonomous system (AS1 of Figure 4) that sends capability update messages to the router in AS2 (column 6, lines 17-44). Chen also discloses a computer readable medium with program instructions to perform the method (claim 16).

Chen does not disclose marking edges, that represent a connection between two AS, as tentative; determining whether a first AS claims a connection to a second AS; determining from an advertisement communication whether a second AS claims a connection to the first AS system; if the first AS claims a connection to the second AS and the second AS claims a connection to the first AS then establish that there is a two-way connection between the first and second ASs; if there is a two-way connection

between the first and second AS the mark the edge as verified; and if there is no two-way connection between the first and second AS remove the edge between the first and second ASs.

Ogier discloses a group of autonomous systems (18 of Figure 5; A, B, C, D, E of Figure 5) that transmit hello messages to one another (2810 of Figure 28) to build a network connection database (Abstract; column 6, lines 27-37). When a hello message arrived at one AS a series of tests and checks are perform to update the state of the connection between the receiving AS and a neighboring AS (column 6, lines 46-55). When the hello message is first received, the status of the neighbor is temporarily set to LOST (2820 of Figure 28; column 51, lines 31-36; viewed as equivalent to setting edge connection to tentative). Ogier's AS also checks if the hello message was a reply from a neighbor, and if it was from a neighbor then the status of the connection is set to '2-WAY' (2844 of Figure 28; column 52, lines 26-31). When a hello message is first received, the AS will send a neighbor reply to verify the existing 2-way connection (2834 of Figure 28; column 51, lines 50-60; column 51, lines 65-67; where "node i will attempt to verify 2-WAY communication"). The AS will also check a running timer and if the connection is not "2-WAY" (the connection is set to "1-WAY") then the status is changed to "LOST" and the connection is removed (column 53, lines 33-36).

Ogier teaches the benefit of faster updates by using small hello messages (column 3, liens 15-17) to update routing affected by broken links (column 6, lines 55-60). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the method of Ogier with the method of Chen.

Chen does not disclose creating directed graphs by the routers.

Gao, in an invention for autonomous system connections (Abstract), teaches an algorithm to create autonomous system graphs (Figure 4; Figure 5; left column, section A, pg 739). The graphs are used to see relationships between nodes and autonomous systems (left column, 4th full paragraph, pg 739).

Gao teaches the benefit of greater contract support and greater backup connectivity by building graphs for autonomous systems (right column, first full paragraph, pg 733). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the graph creation as taught by Gao with the method of Chen.

Chen does not disclose receiving an advertisement comprising a list of all autonomous systems connect to a single autonomous system and for each connection claimed by the single autonomous system with another autonomous system within an inter-network that is reciprocated by the other autonomous system establishing a two-way connectivity.

Visser discloses sending all routes from one router (10 of Figure 1) to another router (14, 15 of Figure 1) in a BGP protocol network (column 3, lines 21-25; column 4, lines 13-19). Once a router obtains all the routes from its neighboring router it would be able to create two-way connections as shown by Ogier.

Visser teaches the benefit of less network disruption by hiding router failures with redundant BGP information (column 2, lines 3-5). Thus, it would have been obvious to

one of ordinary skill in the art at the time of the invention to use the method of Visser with the method of Chen.

With respect to claim 18, Chen further discloses receiving update messages (column 6, lines 17-30) containing routing information.

Chen does not disclose performing verification by the routers.

Ogier discloses a group of autonomous systems (18 of Figure 5; A, B, C, D, E of Figure 5) that transmit hello messages to one another (2810 of Figure 28) to build a network connection database (Abstract; column 6, lines 27-37). When a hello message is first received, the AS will send a neighbor reply to verify the existing 2-way connection (2834 of Figure 28; column 51, lines 50-60; column 51, lines 65-67; where "node i will attempt to verify 2-WAY communication").

Ogier teaches the benefit of faster updates by using small hello messages (column 3, liens 15-17) to update routing affected by broken links (column 6, lines 55-60). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the method of Ogier with the method of Chen.

Chen does not disclose creating directed graphs by the routers.

Gao, in an invention for autonomous system connections (Abstract), teaches an algorithm to create autonomous system graphs (Figure 4; Figure 5; left column, section A, pg 739). The graphs are used to see relationships between nodes and autonomous systems (left column, 4th full paragraph, pg 739).

Gao teaches the benefit of greater contract support and greater backup connectivity by building graphs for autonomous systems (right column, first full

paragraph, pg 733). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the graph creation as taught by Gao with the method of Chen.

With respect to claim 19, Chen fails to disclose a table that is referenced to verify one or more autonomous system paths.

Ogier discloses a group of autonomous systems (18 of Figure 5; A, B, C, D, E of Figure 5) that transmit hello messages to one another (2810 of Figure 28) to build a network connection database (Abstract; column 6, lines 27-37). Each AS has a table of neighbors (1932 of Figure 19).

Ogier teaches the benefit of faster updates by using small hello messages (column 3, liens 15-17) to update routing affected by broken links (column 6, lines 55-60). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the method of Ogier with the method of Chen.

Chen fails to disclose a directed graph stored in a table.

Gao, in an invention for autonomous system connections (Abstract), teaches an algorithm to create autonomous system graphs (Figure 4; Figure 5; left column, section A, pg 739). The graphs are used to see relationships between nodes and autonomous systems (left column, 4th full paragraph, pg 739).

Gao teaches the benefit of greater contract support and greater backup connectivity by building graphs for autonomous systems (right column, first full paragraph, pg 733). Thus, it would have been obvious to one of ordinary skill in the art

at the time of the invention to use the graph creation as taught by Gao with the method of Chen.

With respect to claim 20, Chen further discloses using a Border Gateway Protocol to send the update messages (Abstract).

5. Claims 6, 11, 16, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen in view of Ogier and further in view of Gao and further in view of Klinker (US 2006/0182034; hereafter Klinker).

With respect to claim 6, Chen fails to disclose an administrator element that is operable to communicate information included within the directed graph to one or more additional network elements.

Klinker, in an invention of identification of multiple paths in a network, discloses a controller (605 of Figure 6; paragraph **[0144]**; viewed as equivalent to an administrator element) for exchanging path information among network elements (DALLAS, SEATTLE, CHICAGO of Figure 1D).

Klinker teaches the benefit of more efficient network operations by using a controller to analyze the network performance (paragraph **[0029]**). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the controller of Klinker with the system of Chen.

With respect to claim 11, Chen fails to specifically disclose an administrator element that is operable to communicate information included within the directed graph to one or more additional network elements.

Klinker, in an invention of identification of multiple paths in a network, discloses a controller (605 of Figure 6; paragraph **[0144]**; viewed as equivalent to an administrator element) for exchanging path information among network elements (DALLS, SEATTLE, CHICAGO of Figure 1D).

Klinker teaches the benefit of more efficient network operations by using a controller to analyze the network performance (paragraph **[0029]**). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the controller method of Klinker with the method of Chen.

With respect to claim 16, Chen fails to disclose an administrator element that is operable to communicate information included within the directed graph to one or more additional network elements.

Klinker, in an invention of identification of multiple paths in a network, discloses a controller (605 of Figure 6; paragraph **[0144]**; viewed as equivalent to an administrator element) for exchanging path information among network elements (DALLAS, SEATTLE, CHICAGO of Figure 1D).

Klinker teaches the benefit of more efficient network operations by using a controller to analyze the network performance (paragraph **[0029]**). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the controller of Klinker with the system of Chen.

With respect to claim 21, Chen fails to specifically disclose an administrator element that is operable to communicate information included within the directed graph to one or more additional network elements.

Klinker, in an invention of identification of multiple paths in a network, discloses a controller (605 of Figure 6; paragraph **[0144]**; viewed as equivalent to an administrator element) for exchanging path information among network elements (DALLS, SEATTLE, CHICAGO of Figure 1D).

Klinker teaches the benefit of more efficient network operations by using a controller to analyze the network performance (paragraph **[0029]**). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the controller method of Klinker with the method of Chen.

Response to Arguments

6. Applicant's arguments with respect to claims 1, 7, 12, and 17 have been considered but are moot in view of the new ground(s) of rejection necessitated by applicant's amendment of "receiving an advertisement comprising a list of all autonomous systems connect to a single autonomous system and for each connection claimed by the single autonomous system with another autonomous system within an inter-network that is reciprocated by the other autonomous system establishing a two-way connectivity" to each of claims 1, 7, 12, and 17.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRIAN O CONNOR whose telephone number is (571)270-1081. The examiner can normally be reached on M-F, 9AM-5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Kizou can be reached on 571-272-3088. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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April 10, 2009
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